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(54) **AUTOMOTIVE MULTI-POSITION SEAT ASSEMBLY**

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See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

629,258	A *	7/1899	Johnston	297/94
923,197	A *	6/1909	Murchison	297/94
1,443,479	A *	1/1923	Lambert	297/94
3,165,350	A	1/1965	Willson	
3,531,552	A *	9/1970	Getz et al.	264/46.7
4,168,860	A *	9/1979	Garza et al.	297/92
4,407,542	A	10/1983	Kehl et al.	
4,487,452	A	12/1984	Tanizaki et al.	
4,655,503	A	4/1987	Kamijo et al.	
4,685,719	A	8/1987	Hanemaayer	
4,779,917	A	10/1988	Campbell et al.	
4,792,188	A	12/1988	Kawashima	
5,000,505	A	3/1991	Kawashita et al.	
5,046,433	A	9/1991	Kramer et al.	
5,149,171	A	9/1992	Gilevich et al.	
5,197,774	A	3/1993	Diaz	
5,322,341	A	6/1994	Harrison et al.	
5,451,009	A	9/1995	Rumpf	
5,482,354	A	1/1996	Gryp	
5,524,962	A	6/1996	Fulgenzi et al.	
5,639,141	A	6/1997	Hanemaayer	
5,947,541	A	9/1999	Behrens et al.	
5,967,608	A	10/1999	Van Sickle	
6,000,742	A	12/1999	Schaefer et al.	
D419,520	S	1/2000	Bergh	
6,065,798	A	5/2000	Sankrithi	
6,079,773	A	6/2000	Hassan	

(Continued)

FOREIGN PATENT DOCUMENTS

WO	WO 02/14103 A1	2/2002

OTHER PUBLICATIONS

Magna-Intier Seat, Jun. 8, 2004.

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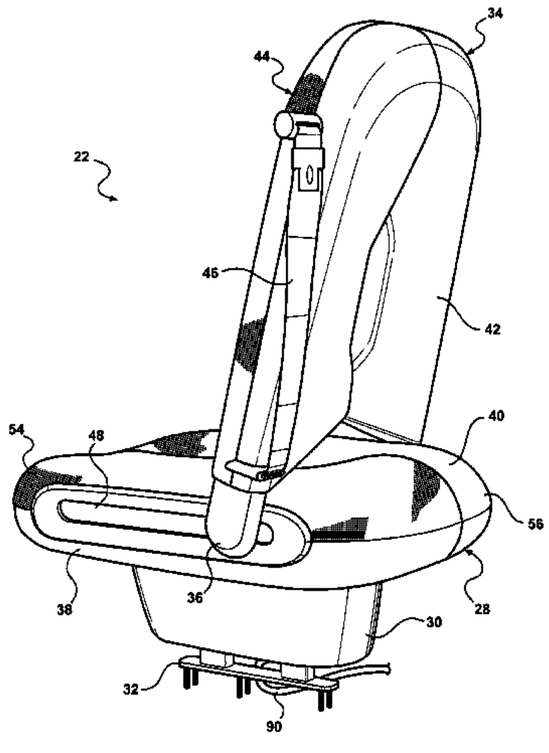
(57) **ABSTRACT**

A seat assembly is disclosed for a passenger vehicle which provides multiple positions by translating a seat back between a fore position and an aft position relative to the seat bottom. A carriage is disclosed mounted to a track within a seat bottom for translating the seat back to the fore and aft positions. A motor and transmission are disclosed for driving the carriage. Additionally, a mechanism is disclosed for adjusting the tilt angle of the seat back as it is translated. A method for adjusting a seat assembly is provided.

19 Claims, 8 Drawing Sheets



U.S. PATENT DOCUMENTS

D430,534	S	9/2000	Golenz
6,126,218	A	10/2000	Karhumaki
6,129,404	A	10/2000	Mattarella et al.
6,168,234	B1	1/2001	Haynes et al.
6,199,945	B1	3/2001	Kim
6,315,352	B1	11/2001	Nomura
6,402,246	B1	6/2002	Mundell
6,439,443	B1	8/2002	Liao
6,457,694	B1	10/2002	Haynes et al.
6,471,297	B1	10/2002	Runde et al.
6,474,739	B1	11/2002	Lagerweij
6,474,741	B1	11/2002	Kamida et al.
6,488,333	B1	12/2002	Kim
6,494,531	B1	12/2002	Kim
6,575,420	B1	6/2003	Yoshida et al.
2005/0253433	A1	11/2005	Brown et al.

* cited by examiner

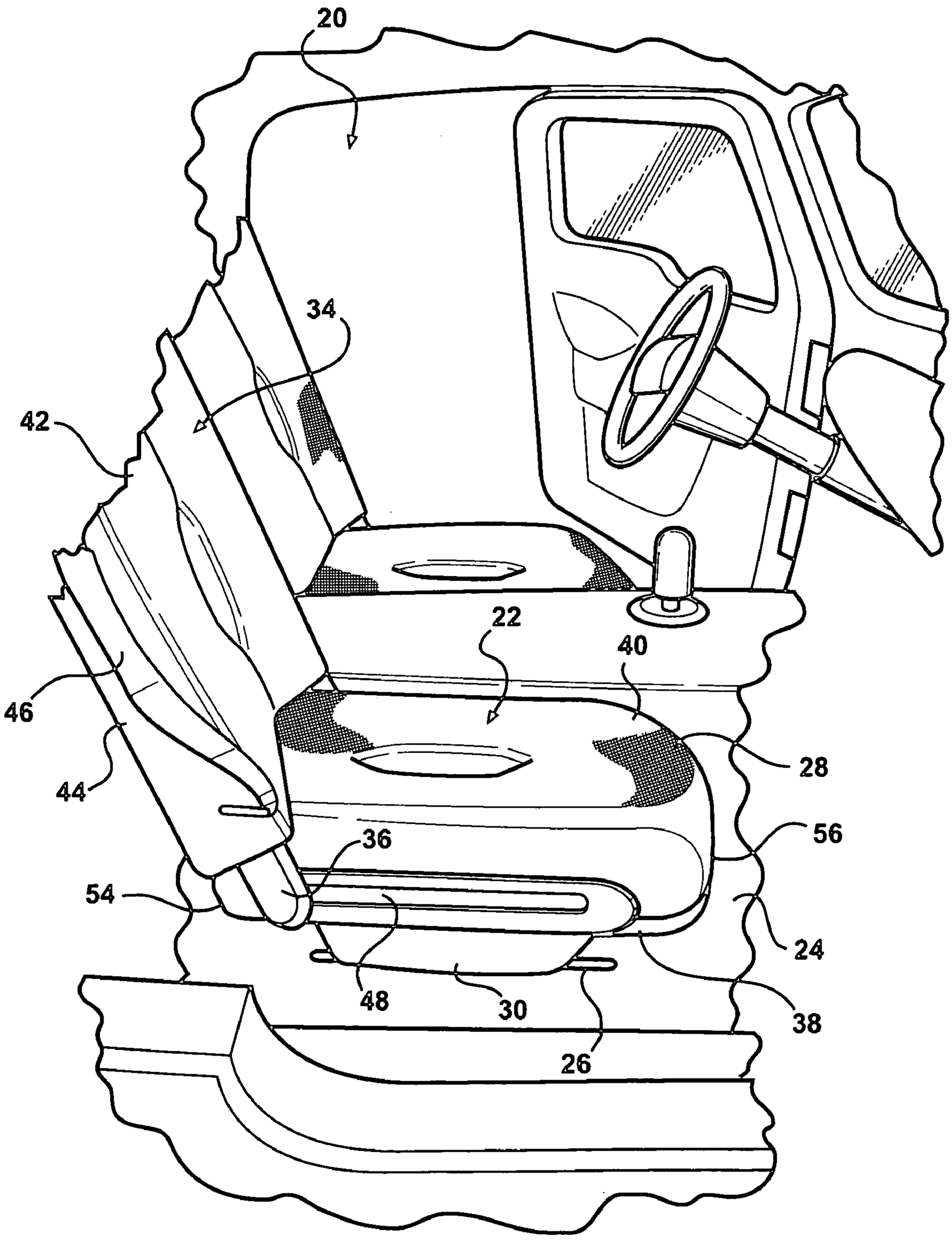


FIG - 1

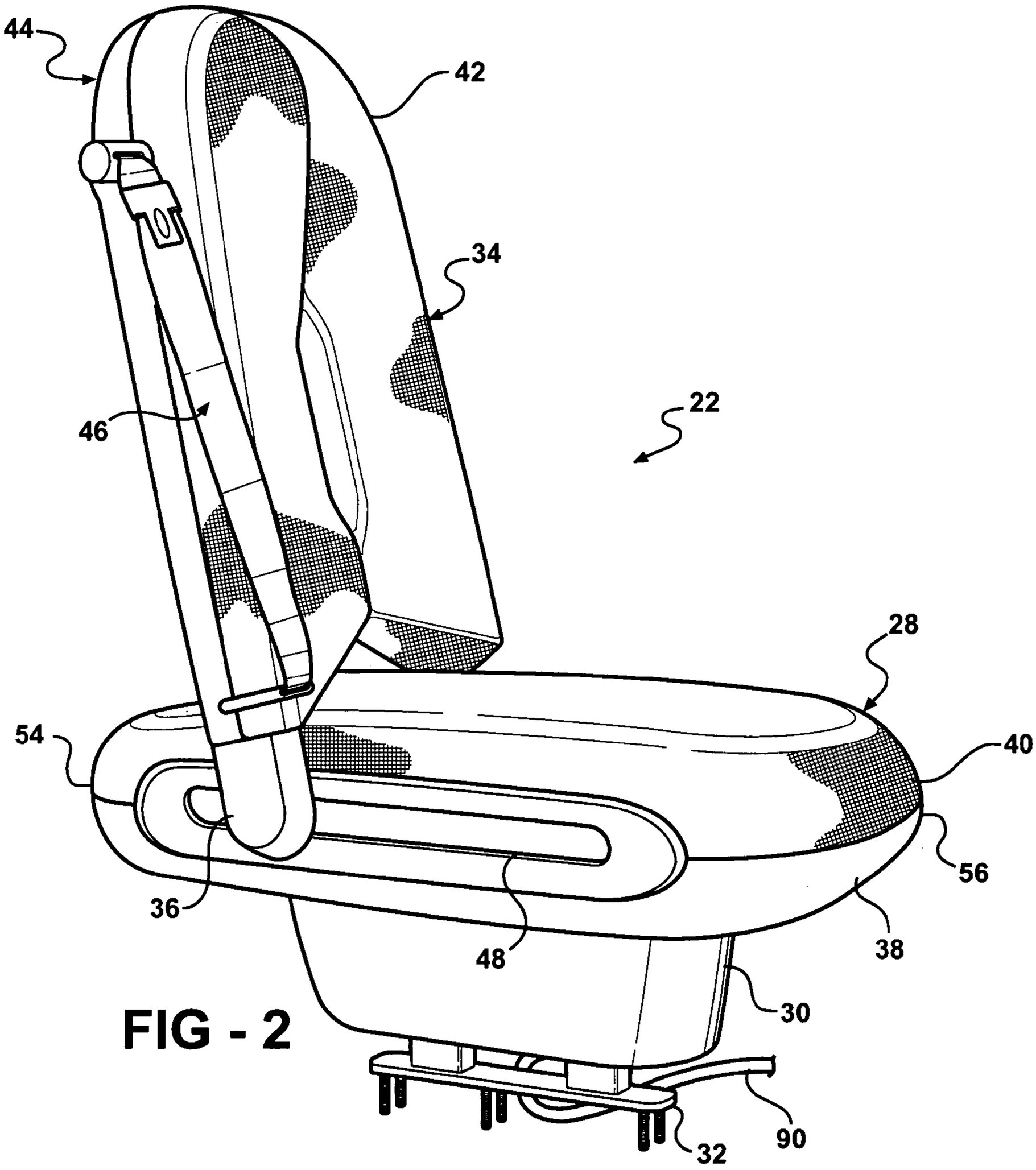


FIG - 2

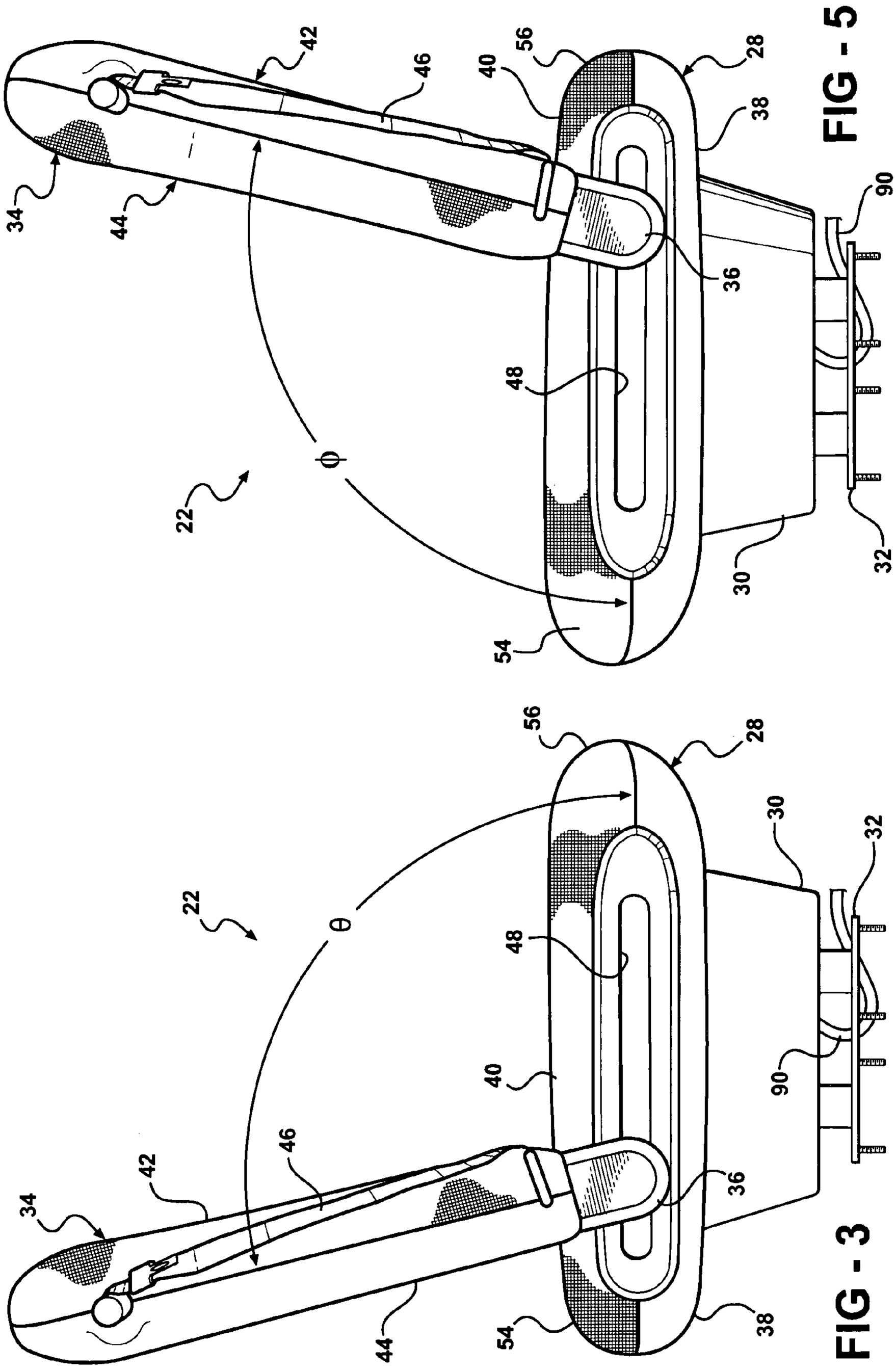

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FIG - 5

FIG - 3

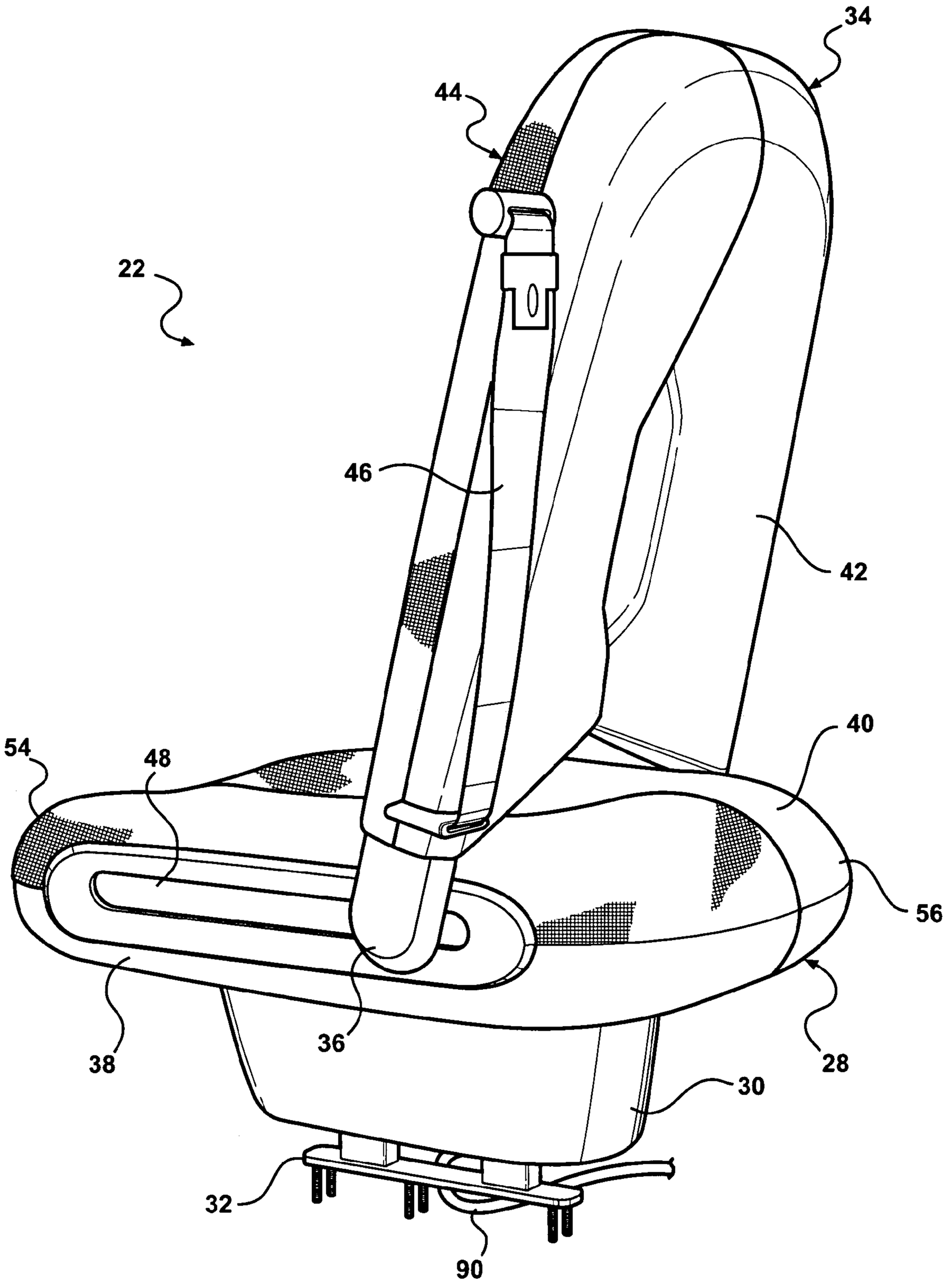

FIG - 4

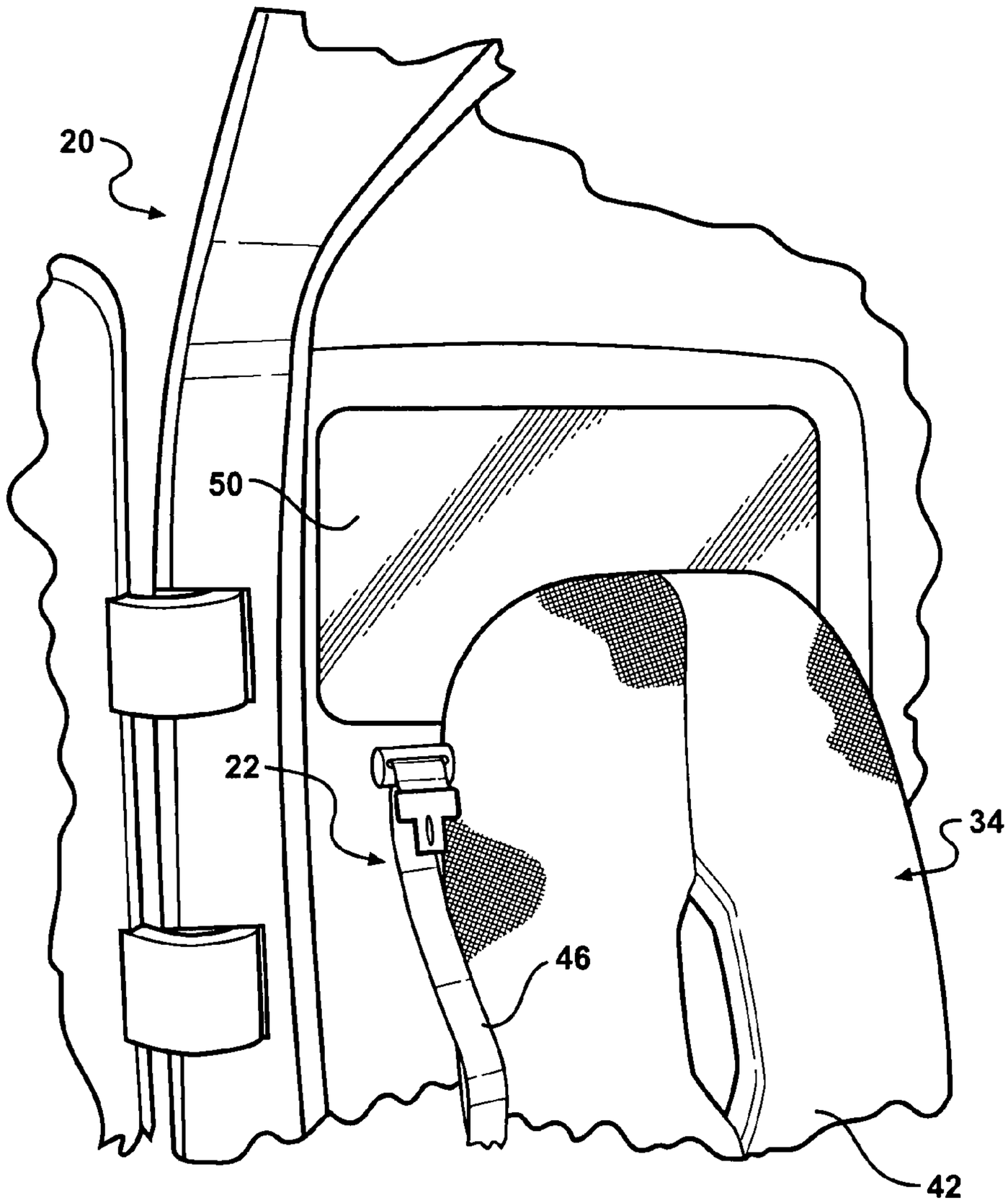

FIG - 6

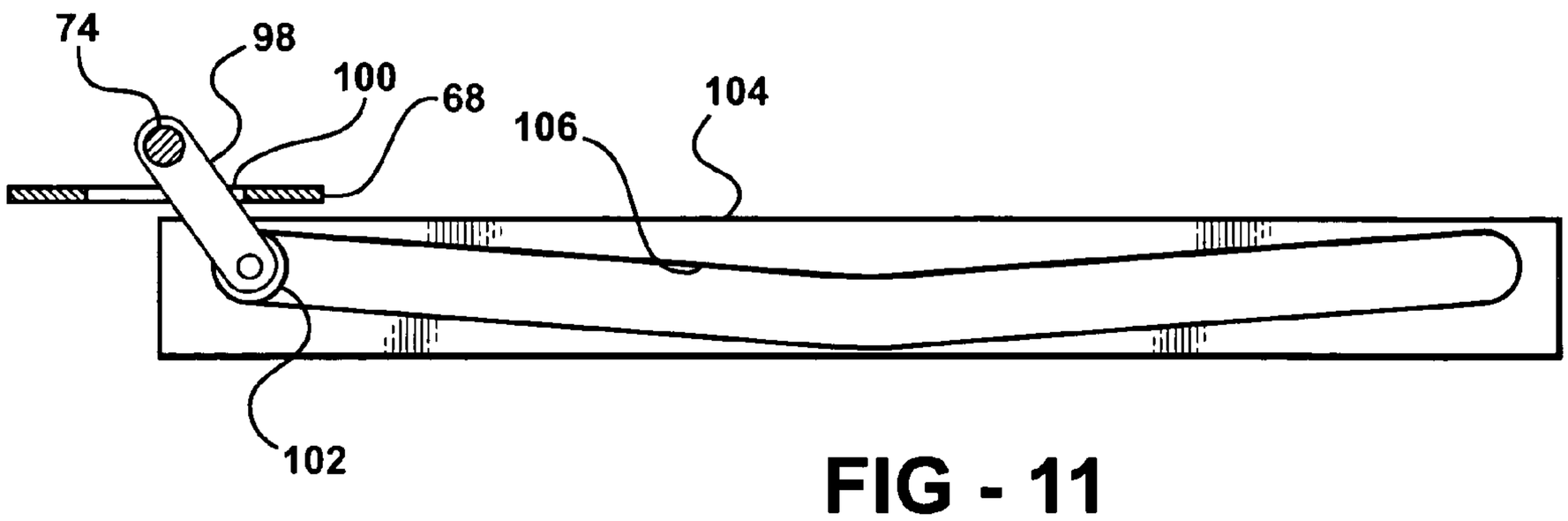

FIG - 11

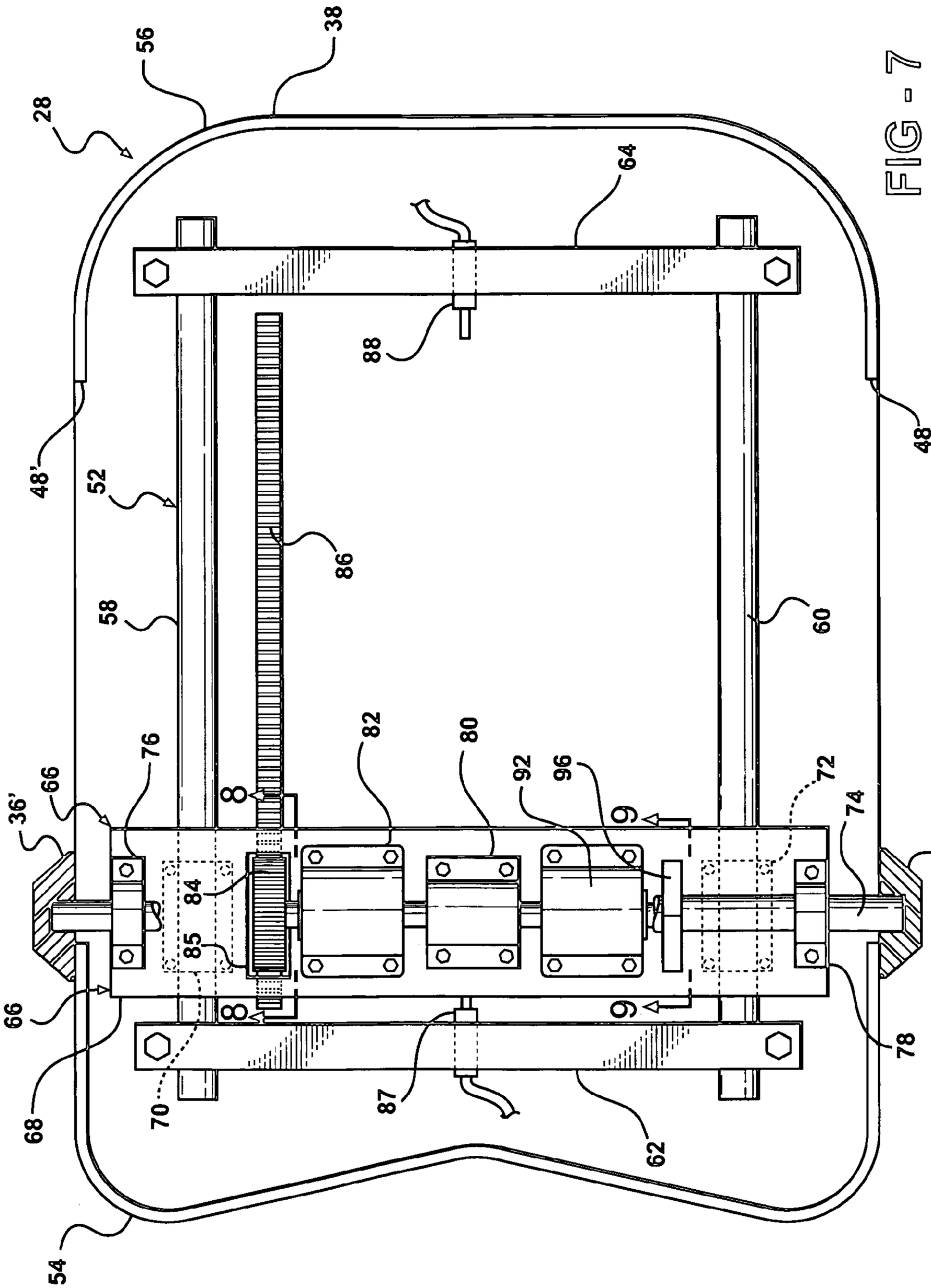
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FIG - 7

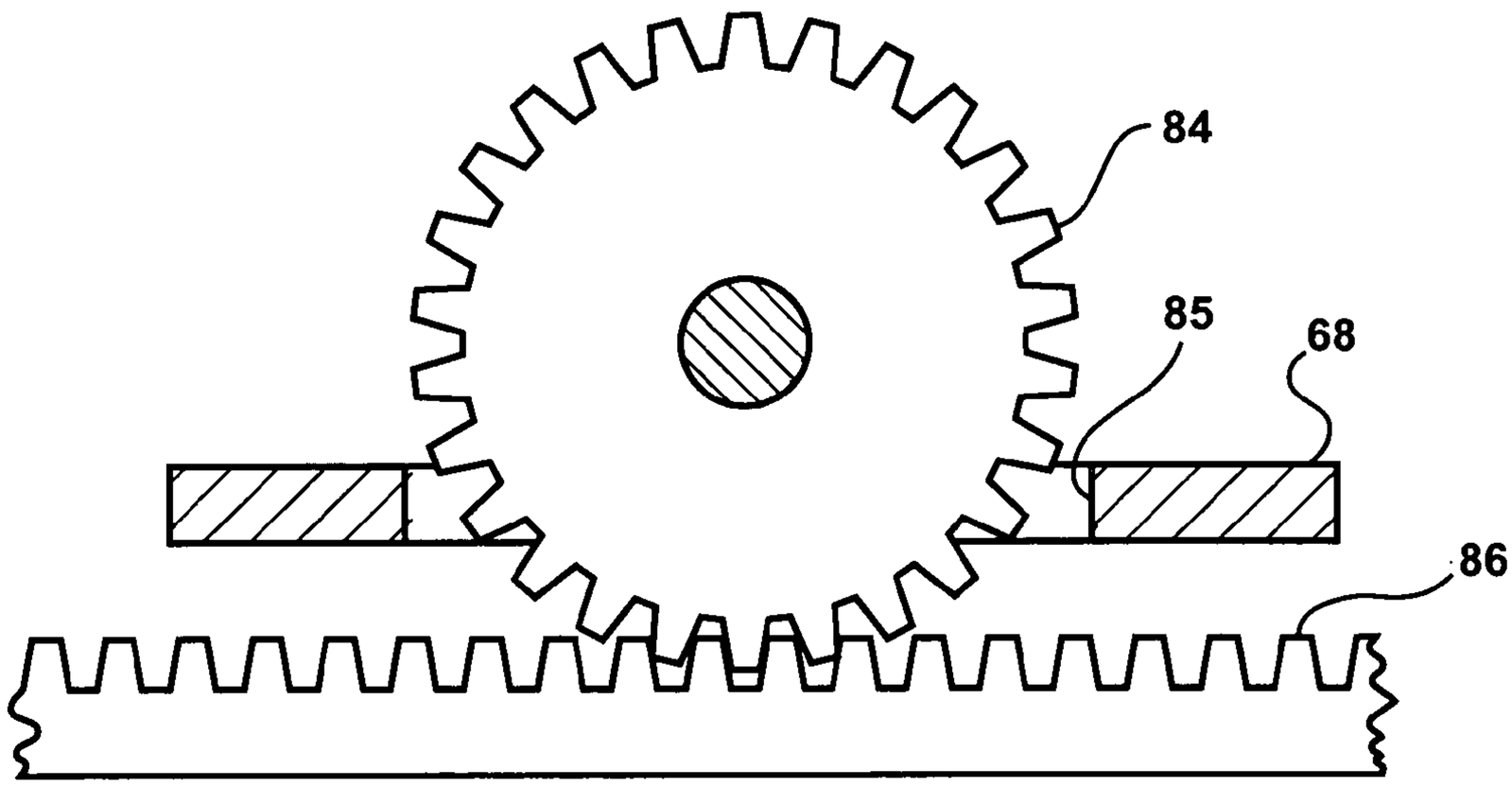

FIG - 8

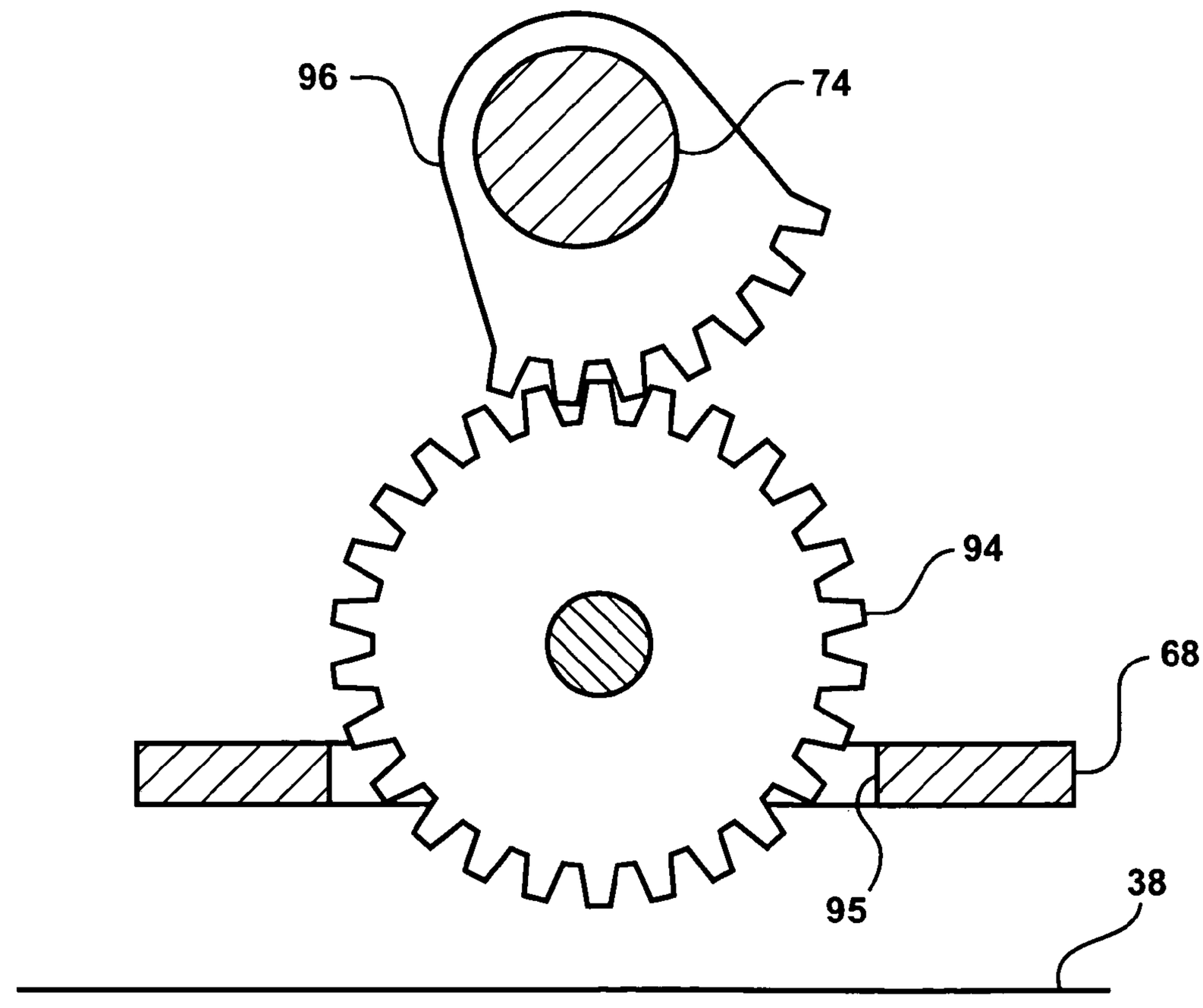

FIG - 9

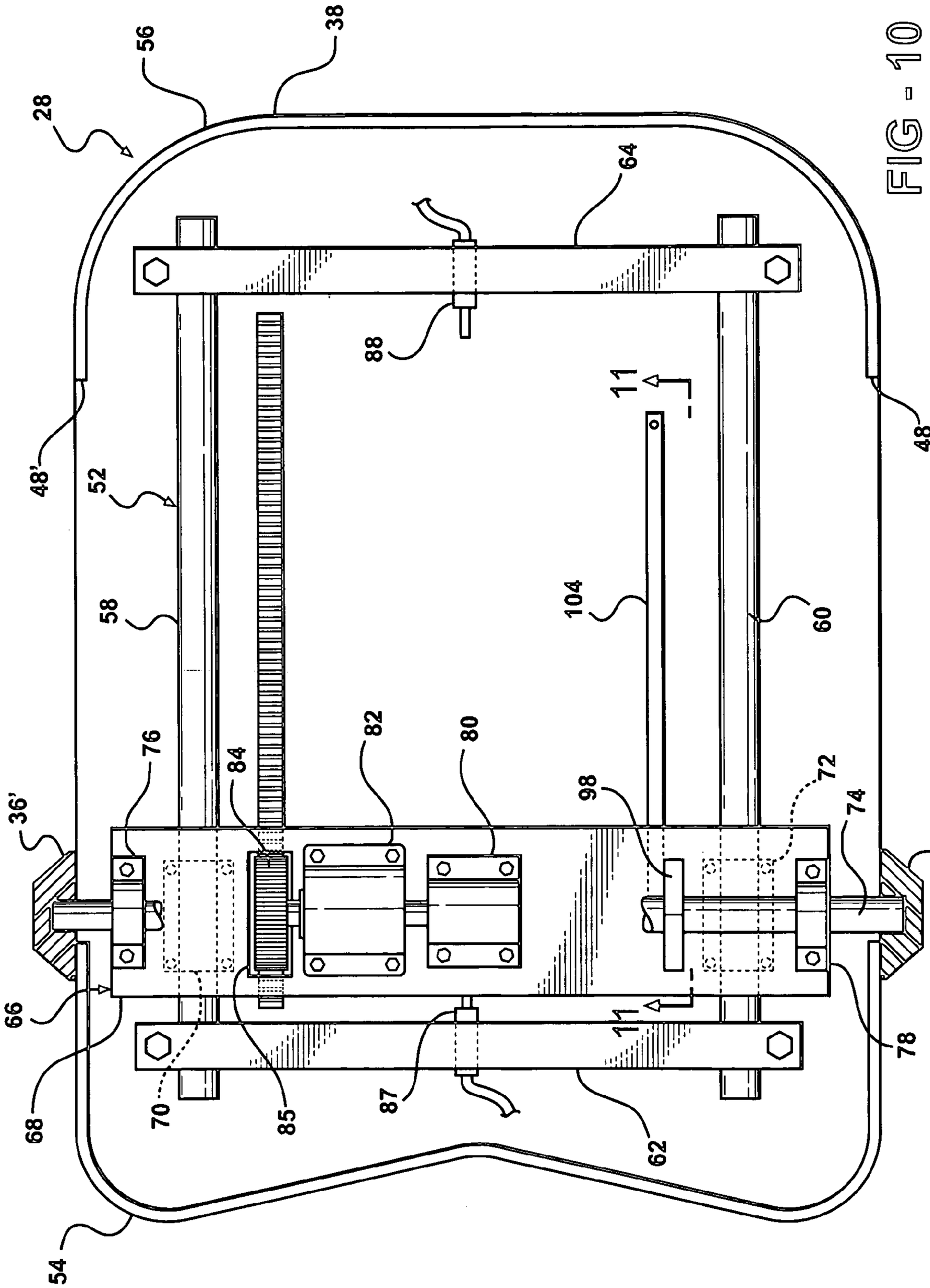
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FIG - 10

AUTOMOTIVE MULTI-POSITION SEAT ASSEMBLY

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to automotive seat assemblies, more particularly to adjustable automotive seat assemblies.

2. Background Art

Automotive seating assemblies are continuously advancing. The market for motor vehicles, particularly passenger vehicles, has expressed an interest for passenger vehicles that optimize comfort, flexibility and features within a vehicle's interior.

In the advent of increased popularity of passenger/cargo vehicles such as SUVs or minivans, flexibility in seating, seating arrangements, seat adjustments and the like are well received by the consumer market. Accordingly, automotive manufacturers have incorporated various flexible features, such as collapsible seats, foldable seats, removable seats and the like so that the passenger may arrange the seats in a desired fashion.

Due to advances in modern electronics, many electronics that were conventionally associated with audio/video equipment for home or personal use, have eventually made their way into vehicle interiors. Such electronics include televisions, video game systems or the like.

Advances in electronic technology have permitted (utilization of exterior mounted cameras for receiving external images, which are subsequently displayed within the vehicle. Such displays assist, for example, in backing up, or driving in reverse, particularly in larger vehicles such as large sedans, SUVs, minivans, or the like.

In view of the foregoing, a flexible seat assembly is needed, that provides multiple seating positions. Also a method for adjusting a seat assembly to multiple positions is needed.

SUMMARY OF THE INVENTION

An aspect of the present invention is to provide a seat assembly for a passenger vehicle. The seat assembly has a seat bottom frame with a track mounted therein extending from a forward end to a rearward end. A carriage is mounted to the track for translation along the track. A motor and a transmission drive the carriage between a fore position and an aft position. A cushion is mounted to the seat bottom frame for receiving a passenger. A seat back is mounted to the carriage for translation with the carriage to the fore and aft positions thereby providing at least two seating positions upon the seat assembly.

Another aspect of the invention is to provide a seat assembly having a linear track mounted in a seat bottom frame. A carriage is mounted to the track for linear translation. A motor and transmission are mounted to the carriage for driving the carriage along the track between a fore position and an aft position. A seat bottom cushion is mounted to the seat bottom frame for receiving a passenger. A transverse shaft is mounted to the carriage and extends externally from the frame. The transverse shaft cooperates with either the carriage or frame so that as the carriage translates, the transverse shaft is rotated. A seat back is mounted to the transverse shaft for both translation along the track and for rotation between the fore and the aft positions.

Another aspect of the present invention is to provide a translatable seat back wherein a tilt orientation of the seat back is a function of a position of a carriage that translates within a seat bottom frame.

Yet another aspect of the present invention is wherein the seat back and seat bottom form an included angle that is obtuse in the aft position and another included angle in the fore position, which is also obtuse.

An aspect of the present invention is wherein the transmission adjusts a tilt position of the seat back as the seat back is translated.

A further aspect of the present invention is to provide a pair of limit switches on the seat bottom frame each oriented at one of the fore and aft positions to engage the carriage and indicate a limit in a range of travel of the carriage for discontinuing rotation of the motor.

Yet another aspect of the invention is wherein the track includes a pair of longitudinally extending guide shafts.

A further aspect of the invention is wherein the carriage includes a pair of linear slide bearings, each mounted to a guide shaft.

An additional aspect of the invention is wherein the motor and transmission are mounted to the carriage.

In one embodiment, a gear rack is provided longitudinally on the seat bottom frame, and a pinion gear is driven by the transmission and engaged with the gear rack for translation of the carriage.

A further aspect of the invention is to provide a seat back pivotally connected to a carriage in the seat bottom.

In one embodiment, a secondary transmission is provided in geared engagement with the seat back for adjusting a tilt position.

Another aspect provides a transverse shaft mounted to the carriage and extending from the seat bottom frame for receiving the seat back.

In one embodiment, a longitudinal cam track is mounted to a seat bottom frame and a cam follower is mounted to a transverse shaft of the seat back, in cooperation with the cam track such that as the seat back is translated, the cam follower adjusts a rotational orientation of the seat back.

A further aspect of the present invention is to provide a rotary bearing mounted on the carriage for receiving a transverse shaft of a seat back.

Another further aspect of the present invention is to provide a seat back with a pair of brackets extending to opposed lateral sides of the seat bottom frame, wherein each bracket is fixed to a distal end of a transverse shaft that mounts to a carriage within the seat bottom frame.

Yet another aspect of the present invention is to provide a seat assembly having a secondary transmission in geared engagement with the transverse shaft for adjusting a tilt position of the seat back.

An even further aspect of the invention is to provide a seat assembly having a gear mounted to the transverse shaft in geared engagement with and driven by the secondary transmission.

In one embodiment, the transverse shaft of the seat back includes a sector gear driven by the secondary transmission.

Another aspect of the invention is to provide a method for adjusting a seat assembly, by translating a seat back from an aft position wherein a passenger may sit on a seat bottom and face a first direction of the vehicle, to a fore position wherein the passenger may sit on the seat bottom and face a second direction. The method provides pivoting the seat back from a first tilt angle in the aft position to a second tilt angle in the fore position.

The above aspects, objects, embodiments, benefits and advantages are apparent in the attached figures and in the detailed description of embodiments of the invention below.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a passenger-side perspective view of an automotive interior, in accordance with the present invention, illustrating a seat assembly in a first position;

FIG. **2** is a perspective view of the seat assembly of FIG. **1**, illustrated in the first position;

FIG. **3** is a side elevation view of the seat assembly of FIG. **1**, illustrated in the first position;

FIG. **4** is a side perspective view of the seat assembly of FIG. **1**, illustrated in a second position;

FIG. **5** is a side elevation view of the seat assembly of FIG. **1**, illustrated in the second position;

FIG. **6** is a front perspective view of the automotive interior of FIG. **1**;

FIG. **7** is a fragmentary top plan view of the seat assembly of FIG. **1**;

FIG. **8** is an enlarged section view taken along section line **8**—**8** in FIG. **7**;

FIG. **9** is an enlarged section view taken along section line **9**—**9** in FIG. **7**;

FIG. **10** is a fragmentary top plan view of an alternative embodiment seat assembly in accordance with the present invention; and

FIG. **11** is an enlarged section view taken along section line **11**—**11** in FIG. **10**.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

With reference now to FIG. **1**, an automotive vehicle interior **20** is illustrated, specifically the interior of an SUV. The invention contemplates, however, any automotive interior within the spirit and scope of the present invention. The automotive interior **20** includes a first row of seat assemblies **22** each mounted to a vehicle floor **24**. Each seat assembly **22** may be mounted to a track **26** in the vehicle floor **24** for longitudinal displacement of the seat assembly **22** relative to the vehicle.

Referring now to FIGS. **2** and **3**, the seat assembly **22** is illustrated in a first seating position corresponding to that illustrated in FIG. **1**, wherein the passenger faces a forward direction of the vehicle.

The seat assembly **22** includes a seat bottom **28**. The seat bottom **28** is supported upon a riser **30** for spacing the seat bottom **28** from the vehicle floor **24**. The seat assembly **22** also includes a mounting bracket **32** for mounting the seat assembly **22** to the vehicle floor **24**. The mounting bracket **32** may cooperate with the track **26** for translating the seat assembly **22** relative to the automotive interior **20**.

The seat assembly also includes a seat back **34** that is mounted to the seat bottom **28**. The seat back **34** includes a pair of brackets **36**, **36'** that each extend to a lateral side of the seat bottom **28** for engagement therewith. The seat brackets **36**, **36'** support the seat back **34** relative to the seat bottom **28**.

The seat bottom **28** includes a seat bottom frame **38** with a seat bottom cushion **40** provided thereupon. When the passenger sits on the seat assembly **22** in the forward facing direction of FIGS. **1**–**3**, the user is seated upon the seat bottom cushion **40** and the passenger rests its back against the seat back **34**. The seat back **34** is padded on a forward facing side **42** and a rearward facing side **44** for providing comfort and support to the passenger in multiple positions thereof. The seat back **34** also includes a seat belt assembly **46** for securing the passenger to the seat assembly **22** in the forward facing direction.

The seat bottom **28** includes a pair of slots **48**, **48'** formed through its lateral sides. The seat back **34** cooperates with a track provided within the seat bottom frame **38** through the slots **48**, **48'** formed in the sides of the seat bottom **28**.

In the forward facing direction of the seat assembly **22**, the seat back **34** is oriented at a rearward or aft position relative to the seat bottom **28** and is angled having a seat back tilt for comfortably supporting the passenger. The seat back tilt is generally provided at an included angle as an obtuse angle provided between the seat back **34** and the seat bottom **28**. This included angle is illustrated by θ in FIG. **3**.

Referring now to FIGS. **4** and **5**, the seat back **34** has been translated to a forward position at a forward end of the seat bottom **28**. At this orientation, the passenger may sit upon the seat bottom cushion **40** and face a rearward direction of the vehicle. The passenger may also rest its back against the cushioned rearward facing side **44** of the seat back **34**. As illustrated in FIG. **5**, when the seat back **34** has translated to the forward end of the seat bottom **28**, the tilt of the seat back **34** is reversed thereby providing an included angle ϕ between the seat back **34** and the seat bottom **28** which is also inclined away from the seat bottom **28** forming an obtuse angle for comfortably receiving the passenger.

The rearward facing orientation of the seat assembly **22** in FIGS. **4** and **5** permits the passenger to sit on the seat assembly **22** and face the reverse direction, without having to rotate the seat assembly **22** or remove and reinstall the seat assembly **22**. Such an orientation may be useful for communicating with others located in a second rearward seating row. Additionally, such a seating position may be effective for rearward viewing while traveling.

In one embodiment, as illustrated in FIG. **6**, the automotive interior **20** may include a visual display such as a flat panel display **50** mounted upon a rearward door in the automotive interior **20**. The flat panel display **50** may be provided in cooperation with a visual media input, such as a DVD player, television signals, computer displays, video game displays, or satellite television channels. Accordingly, a passenger may desire to face rearward and watch a broadcast provided on the flat panel display **50**. The driver seat assembly **22** may also be capable of facing the rearward direction for viewing the flat panel display **50** when the vehicle is parked.

The vehicle may include an exterior camera for receiving an external image rearward of the vehicle, which may be displayed upon the flat panel display **50** during transportation of the vehicle. Such a display substitutes having a rear window for the driver to view an area rearward of the vehicle during travel.

Referring now to FIG. **7**, the seat bottom **28** is illustrated with the seat bottom cushion **40** removed, thus illustrating components mounted within the seat bottom frame **38**. A linear track **52** is mounted to the seat bottom frame **38** and aligned longitudinally for translation of the seat back **34** between a rearward end **54** and a forward end **56** of the seat bottom **28**. The track **52** includes a pair of linear guide shafts **58**, **60** that are mounted to the seat bottom frame **38** by a pair of guide shaft mounting blocks **62**, **64**.

The carriage **66** is mounted to the track **52** for linear translation. The carriage **66** includes a carriage plate **68** with a pair of linear slide bearings **70**, **72**. The linear slide bearings **70**, **72** are fastened to an underside of the carriage plate **68**. Each slide bearing **70**, **72** receives one of the guide

shafts **58**, **60** therethrough for providing bearing support to the carriage **66** as it translates along the guide shafts **58**, **60**.

The seat back brackets **36**, **36'** are mounted to distal ends of a transverse shaft **74**, which extends through slots **48**, **48'** formed through the seat bottom **28**. The transverse shaft **74** is mounted to the carriage plate **68** by a pair of rotary bearings **76**, **78** for providing bearing support to the seat back **34** upon the carriage **66**. The rotary bearings **76**, **78** permit the seat back **34** to pivot relative to the seat bottom **28** as well. The transverse shaft **74** extends from one seat back bracket **36** to the other **36'**. The transverse shaft **74** is illustrated partially fragmented in FIG. **7** to provide a view of the carriage **66** and its associated components displaced underneath the shaft **74**. Of course, the invention contemplates a pair of transverse pivotal connections rather than the elongate transverse shaft **74**.

The carriage **66** includes a motor **80** mounted to the carriage plate **68**. The motor drives a gear box **82** for imparting a reduced rotation to an output pinion gear **84** which extends through aperture **85** in carriage plate **68**. The motor **80** may be a DC motor and the gear box **82** reduces the rotation of the motor **80** to provide a steady and gradual translation of the carriage **66**.

Referring now to FIGS. **7** and **8**, the pinion gear **84** engages a gear rack **86** that is mounted to the seat bottom frame **38**. Thus, the reduced rotation imparted to the pinion gear **84** drives the pinion gear **84** and consequently the carriage **66** along the rack **86**.

Referring back to FIG. **7**, although the motor **80** and gear box **82** are illustrated mounted to the carriage **66**, the invention contemplates that the motor **80**, gear box **82** and output could be mounted to the seat bottom frame **38**, and the motor output could be utilized for engaging the carriage **66** and driving the carriage **66** along the track **52**.

The motor **80** is utilized for driving the carriage **66** between the aft position as illustrated in FIG. **7**, wherein the carriage **66** is mounted proximate to the seat bottom rearward end **54**, and the fore position wherein the carriage **66** is translated proximate to the seat bottom forward end **38**.

A pair of limit switches **87**, **88** are provided mounted to the seat bottom frame **38**. The limit switches **87**, **88** are each mounted to one of the guide shaft blocks **62**, **64** for engagement with the carriage **66** when it reaches either position in its range of translation. When the passenger desires to translate the seat back **34** from the aft position to the fore position, the passenger inputs a command within the vehicle interior **20** by, for example, pressing a button associated with the seat assembly **22**. The input signal results in power imparted to the motor **80** which subsequently drives the gear box **82** and pinion gear **84** causing the carriage **66** to translate along the track **52**. When the carriage **66** reaches the fore position, the carriage **66** engages the limit switch **88**, which conveys a signal indicating that the carriage **66** has reached the fore position, and the power to the motor **80** is discontinued.

When the passenger inputs a signal to translate the carriage **66** from the fore position to the aft position, power is imparted to the motor **80** that generates a reverse rotation so that the carriage **66** translates in an opposite direction. Upon reaching the aft position, the limit switch **87** conveys a signal, which results in a termination of power imparted to the motor **80**. The associated wiring for the motor **80** and limit switches **87**, **88** is routed through a wire harness **90** that extends to the riser **30** as illustrated in FIGS. **2**–**5**.

Although limit switches **87**, **88** are illustrated and described, other position sensing devices may be employed within the spirit and scope of the present invention. For example, proximity sensors may be utilized for sensing the location of the carriage **66**. A servo motor could be utilized for determining the position of the carriage **66**. Alternatively, load sensors may be provided on the motor **80** for measuring an increased load imparted to the motor **80** characteristic of the carriage **66** reaching a limit in its travel.

The seat back **34** cooperates with the seat bottom **28** so that as the seat back is translated linearly, the tilt angle of the seat back is adjusted as well. For example, the motor **80** may have an output shaft extending from both ends for driving the first gear box **82** and a second gear box **92**.

Referring now to FIGS. **7** and **9**, the second gear box **92** drives an output pinion gear **94** which extends through aperture **95** in carriage plate **68**. The second gear box **92** provides a reduced rotation that is reduced more than that provided by the first gear box **82**. The pinion gear **94** is geared in engagement with a sector gear **96** that is mounted to the transverse shaft **74**. Thus, as the motor **80** drives the carriage **66** along the track **52**, the motor also drives the transverse shaft **74** for adjusting the tilt angle of the seat back **34**. The output rotation of the second gear box **92** is reduced much greater than that of the first gear box **82** because only a partial rotation of the transverse shaft **74** is required.

Although a pair of gear boxes **82**, **84** are illustrated on opposed output sides of the motor **80**, the invention contemplates that the motor **80** may drive, in series, the first gear box **82**, the pinion gear **84**, and a subsequent reduction gear stage that drives the transverse shaft **74**.

Alternatively, with reference to FIGS. **10** and **11**, an alternative tilt adjust mechanism is illustrated for tilting the seat back **34**. Rather than a second transmission, the transverse shaft **74** includes a cam follower **98** extending therefrom through an aperture **100** formed in the carriage plate **68**. A cam follower bearing **102** is mounted to a distal end of the cam follower **98**. A cam track **104** is mounted to the seat bottom frame **38**. The bearing **102** is disposed within a cam groove **106** formed in the cam track **104**. The cam groove **106** includes upward peaks proximate to the aft position and the fore position for rotating the transverse shaft **74** relative to the carriage **66** and providing the desired tilt for tilting the seat back **34**.

Although the seat back tilt is a function of translation of the carriage **66**, the invention contemplates that a second DC motor could be provided for permitting user desired tilt adjustment of the seat back **34** for obtaining various recline and upright positions.

In summary, a seat assembly is disclosed which provides a forward seating position and a rearward seating position by translating the seat back from an aft position to a fore position and pivoting the seat back to a corresponding tilt angle for each position. Thus, the passenger may be provided with multiple seating positions by a press of a button, without requiring manual actuation for rotating, collapsing, flipping or performing other manual tasks for utilizing a common seat assembly in multiple positions.

While embodiment of the invention have been described in detail, those familiar with the art to which this invention relates will recognize various alternative designs and embodiments for practicing the invention as defined by the following claims.

What is claimed is:

1. A seat assembly for a passenger vehicle comprising:

a seat bottom frame adapted to be mounted to a floor of the passenger vehicle, the frame having a forward end and a rearward end;

a linear track mounted to the seat bottom frame extending generally from the forward end to the rearward end;

a carriage slidably mounted to the track for linear translation along the track;

a motor mounted to the carriage;

a transmission mounted to the carriage, operably driven by the motor and operably connected to the seat bottom frame for driving the carriage along the track to a fore position and an aft position;

a seat bottom cushion mounted to the seat bottom frame for receiving a passenger thereon;

a transverse shaft mounted to the carriage, extending external from the seat bottom frame, the transverse shaft being in operable engagement with one of the carriage or seat bottom frame so that the transverse shaft is rotated as the carriage translates; and

a seat back mounted to the transverse shaft for linear translation and rotation from the aft position to the fore position for providing at least two seating positions upon the seating assembly.

2. A seat assembly for a passenger vehicle comprising:

a seat bottom frame adapted to be mounted to a floor of the passenger vehicle, the frame having a forward end and a rearward end;

a track mounted to the seat bottom frame extending generally from the forward end to the rearward end;

a carriage slidably mounted to the track for translation along the track;

a motor mounted to one of the seat bottom frame or the carriage;

a transmission driven by the motor and operably engaged to the other of the seat bottom frame or the carriage for driving the carriage along the track between a fore position and an aft position;

a seat bottom cushion mounted to the seat bottom frame for receiving a passenger thereon; and

a seat back mounted to the carriage for translation with the carriage to the fore and aft positions for providing at least two seating positions upon the seat assembly;

wherein a tilt orientation of the seat back is adjusted as a function of carriage position.

3. The seat assembly of claim **2** wherein the motor and transmission are mounted to the carriage.

4. The seat assembly of claim **2** wherein the transmission is in operable communication with the seat back for adjusting the tilt orientation of the seat back as the seat back is translated.

5. The seat assembly of claim **2** wherein the track is further defined as a pair of longitudinally extending guide shafts.

6. The seat assembly of claim **5** wherein the carriage includes a pair of linear slide bearings each mounted to one of the guide shafts.

7. A seat assembly for a passenger vehicle comprising:

a seat bottom frame adapted to be mounted to a floor of the passenger vehicle, the frame having a forward end and a rearward end;

a track mounted to the seat bottom frame extending generally from the forward end to the rearward end;

a carriage slidably mounted to the track for translation along the track;

a motor mounted to one of the seat bottom frame or the carriage;

a transmission driven by the motor and operably engaged to the other of the seat bottom frame or the carriage for driving the carriage along the track between a fore position and an aft position;

a seat bottom cushion mounted to the seat bottom frame for receiving a passenger thereon; and

a seat back mounted to the carriage for translation with the carriage to the fore and aft positions for providing at least two seating positions upon the seat assembly;

wherein an included angle between the seat back and the seat bottom is an obtuse angle in the aft position and an included angle between the seat back and the seat bottom is an obtuse angle in the fore position.

8. A seat assembly for a passenger vehicle comprising:

a seat bottom frame adapted to be mounted to a floor of the passenger vehicle, the frame having a forward end and a rearward end;

a track mounted to the seat bottom frame extending generally from the forward end to the rearward end;

a carriage slidably mounted to the track for translation along the track;

a motor mounted to one of the seat bottom frame or the carriage;

a transmission driven by the motor and operably engaged to the other of the seat bottom frame or the carriage for driving the carriage along the track between a fore position and an aft position;

a seat bottom cushion mounted to the seat bottom frame for receiving a passenger thereon; and

a seat back mounted to the carriage for translation with the carriage to the fore and aft positions for providing at least two seating positions upon the seat assembly;

a first limit switch mounted to the seat bottom frame oriented so that the carriage engages the limit switch at the fore position and the limit switch conveys a signal indicating a limit in a range of linear travel of the carriage; and

a second limit switch mounted to the seat bottom frame oriented so that the carriage engages the limit switch at the aft position and the limit switch conveys a signal indicating a limit in a range of linear travel of the carriage; and

wherein the limit switch signals are utilized for discontinuing rotation of the motor.

9. A seat assembly for a passenger vehicle comprising:

a seat bottom frame adapted to be mounted to a floor of the passenger vehicle, the frame having a forward end and a rearward end;

a track mounted to the seat bottom frame extending generally from the forward end to the rearward end;

a carriage slidably mounted to the track for translation along the track;

a motor mounted to the carriage;

a transmission mounted to the carriage, being driven by the motor and operably engaged to the seat bottom frame for driving the carriage along the track between a fore position and an aft position;

a seat bottom cushion mounted to the seat bottom frame for receiving a passenger thereon;

a seat back mounted to the carriage for translation with the carriage to the fore and aft positions for providing at least two seating positions upon the seat assembly;

a longitudinal gear rack mounted on the seat bottom frame; and

a pinion gear driven by the transmission in geared engagement with the rack so that the transmission imparts a reduced rotation to the pinion gear thereby driving the carriage along the track.

10. A seat assembly for a passenger vehicle comprising:

a seat bottom frame adapted to be mounted to a floor of the passenger vehicle, the frame having a forward end and a rearward end;

a track mounted to the seat bottom frame extending generally from the forward end to the rearward end;

a carriage slidably mounted to the track for translation along the track;

a motor mounted to one of the seat bottom frame or the carriage;

a transmission driven by the motor and operably engaged to the other of the seat bottom frame or the carriage for driving the carriage along the track between a fore position and an aft position;

a seat bottom cushion mounted to the seat bottom frame for receiving a passenger thereon; and

a seat back mounted to the carriage for translation with the carriage to the fore and aft positions for providing at least two seating positions upon the seat assembly; wherein the seat back is pivotally connected to the carriage.

11. The seat assembly of claim 10 further comprising a secondary transmission in geared engagement with the seat back for adjusting a tilt position of the seat back.

12. The seat assembly of claim 10 further comprising a transverse shaft mounted to the carriage extending externally from the seat bottom frame wherein the seat back is mounted to the transverse shaft.

13. The seat assembly of claim 12 further comprising:

a longitudinal cam track mounted to the seat bottom frame; and

a cam follower mounted to the transverse shaft cooperating with the longitudinal cam track for adjusting a rotational orientation of the cam follower, transverse shaft and the seat back as the carriage translates.

14. The seat assembly of claim 12 wherein the transverse shaft is mounted to the carriage by at least one rotary bearing.

15. The seat assembly of claim 12 wherein the seat back includes a pair of brackets extending to opposed lateral sides of the seat bottom frame, each bracket being fixed to a distal end of the transverse shaft.

16. The seat assembly of claim 12 further comprising a secondary transmission in geared engagement with the transverse shaft for adjusting a tilt position of the seat back.

17. The seat assembly of claim 16 further comprising a gear mounted to the transverse shaft in geared engagement with and driven by the secondary transmission.

18. The seat assembly of claim 17 wherein the transverse shaft gear is further defined as a sector gear.

19. A method for adjusting a seating assembly for multiple seating positions comprising:

translating a seat back by a motorized transmission from an aft position wherein a passenger may sit on a seat bottom and face a first direction, to a fore position relative to the seat bottom wherein the passenger may sit on the seat bottom and face a second direction; and

pivoting the seat back from a first tilt angle in the aft position to a second tilt angle in the fore position as a function of translation from the aft position to the fore position.

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